



Exploring low-income African American and Latinx caregiver perspectives on asthma control in their children and reactions to messaging materials

Michelle Zheang, Erin Rodriguez, Cinthia Alvarado, Rebecca Correa, Lee Ann Kahlor & Elizabeth C. Matsui

To cite this article: Michelle Zheang, Erin Rodriguez, Cinthia Alvarado, Rebecca Correa, Lee Ann Kahlor & Elizabeth C. Matsui (2021): Exploring low-income African American and Latinx caregiver perspectives on asthma control in their children and reactions to messaging materials, Journal of Asthma, DOI: [10.1080/02770903.2021.1903918](https://doi.org/10.1080/02770903.2021.1903918)

To link to this article: <https://doi.org/10.1080/02770903.2021.1903918>



Published online: 25 Mar 2021.



Submit your article to this journal [↗](#)



Article views: 4



View related articles [↗](#)



View Crossmark data [↗](#)



Exploring low-income African American and Latinx caregiver perspectives on asthma control in their children and reactions to messaging materials

Michelle Zheang, BA^a , Erin Rodriguez, PhD^b, Cinthia Alvarado, BA^b, Rebecca Correa, BA^c, Lee Ann Kahlor, PhD^d and Elizabeth C. Matsui, MD, MHS^{c,e}

^aDell Medical School, The University of Texas, Austin, TX, USA; ^bDepartment of Educational Psychology, The University of Texas, Austin, TX, USA; ^cDepartment of Population Health, Dell Medical School, The University of Texas, Austin, TX, USA; ^dSchool of Advertising and Public Relations, Moody College of Communication, The University of Texas, Austin, TX, USA; ^eDepartment of Pediatrics, Dell Medical School, The University of Texas, Austin, TX, USA

ABSTRACT

Background: African-American and Latinx children suffer from higher rates of uncontrolled asthma and poorer outcomes compared to white children. Sociocultural factors play a prominent role in how caregivers navigate asthma control for their children.

Objectives: (1) Explore the knowledge, perceptions and behaviors of Latinx and African-American caregivers related to their children's asthma and identify barriers to achieving asthma control; and (2) Elicit caregiver responses to messaging materials intended to help them better recognize uncontrolled asthma and seek timely medical treatment.

Methods: Study participants were recruited and screened to meet the following inclusion criteria: African-American or Latinx race/ethnicity, household income at or below 185% of the federal poverty line, and at least one child diagnosed with asthma with symptom frequency consistent with uncontrolled asthma according to national guidelines. Participants attended one of three moderator-led focus groups. The transcripts were qualitatively analyzed using a thematic analysis approach.

Results: Themes emerged among the nineteen participants related to asthma assessment, management, emotion, support, and trust. Caregivers exhibited gaps in their asthma knowledge, especially pertaining to the term "asthma control." Caregivers generally worried about asthma emergencies more than the daily impairments caused by uncontrolled asthma. Many were uncomfortable using daily controller medications, citing issues of provider trust and side effect concerns. Caregivers did not recognize uncontrolled asthma in their own child, even after viewing messaging materials informing them of symptom frequency criteria.

Conclusion: Culturally tailored interventions, including public asthma messaging, should address low trust in provider recommendations and caregiver concerns about controller medications.

ARTICLE HISTORY

Received 23 December 2020

Revised 3 March 2021

Accepted 11 March 2021

KEYWORDS

Pediatrics; education; control/management; morbidity and mortality; prevention

Introduction

Uncontrolled asthma in the pediatric population poses a high cost to families and society, resulting in frequent health care utilization, missed school days, and poor quality of life (1). Notably, although the overall prevalence of pediatric asthma in the US is decreasing, racial and ethnic disparities in pediatric asthma prevalence and morbidity are widening (2). Black children with asthma have higher rates of uncontrolled asthma, and are nearly 2-times as likely to visit the ED/UC, 2-times as likely to be hospitalized, and more than 3–4 times as likely to die compared to White children (3,4).

While there has been considerable focus on the barriers to achieving asthma control in Black children, Mexican and Mexican-American children with asthma are a relatively understudied group. Although some estimates suggest that Mexican/Mexican-American children have the lowest

prevalence of asthma of any race or ethnicity, they are the only demographic group in the US in which the prevalence of asthma is rising – from 5.1% in 2001 to 6.5% in 2016 (3). Mexican/Mexican-American children with asthma have similar rates of hospitalization as Black children, and higher numbers of ED/UC visits and missed school days compared to white children (3).

Various systemic factors contributing to disparities in asthma control have been well characterized in the literature, including disproportionate exposure to pollutants and allergens, medical comorbidities, health literacy, and structural barriers preventing access to care (5,6). Additionally, in studies of urban racial and ethnic minority children and their caregivers, medication non-adherence due to caregiver concerns about medication side effects have been associated with poor asthma control (7,8). Incongruence between the caregiver's perceptions of asthma control and objective

measures of asthma control can also lead to symptoms not being recognized and underutilization of asthma management strategies (9). However, little research has addressed how caregivers' beliefs and practices influence perceptions of and reactions to public health messaging about asthma.

Exploring caregiver perspectives regarding their child's asthma, and how these perspectives influence reactions to public messaging, is a crucial step toward addressing racial and ethnic disparities in asthma control. The purpose of this study was to (1) Examine the knowledge, perceptions and behaviors of Latinx and African American caregivers related to their children's asthma; (2) Explore how caregivers' beliefs shaped asthma management, and (3) Explore messaging materials to help caregivers better recognize uncontrolled asthma and seek timely medical treatment.

Methods

Caregivers were recruited to participate in this study by a market research firm in an urban city in the Southwestern U.S., Think Group, via their existing database of potential research participants. Members of Think Group's research database were originally recruited via word of mouth, the website, or through social media advertising. No ads were placed to recruit participants specifically for this study. Approval for the study was obtained from the University of Texas at Austin Institutional Review Board prior to recruitment of study participants.

All recruited participants were screened via an initial, brief telephone interview to ensure they met the following inclusion criteria: primary caregiver for a child diagnosed with asthma, African American or Latinx race and/or ethnicity, household income at or below 185% of the federal poverty line, and child's asthma symptom frequency consistent with uncontrolled asthma according to national guidelines. Although the study did not specifically recruit Mexican or Mexican-American participants, Latinx participants were recruited from an urban metropolitan area where >85% of the Latinx population are of Mexican descent. The choice to recruit for only Latinx and African-American participants was made on the basis that (1) these are the largest racial/ethnic minority groups in the United States as well as in the city where this study was conducted, (2) significant disparities in asthma morbidity and mortality exist within these populations, and (3) other racial/ethnic minority groups were excluded for feasibility of participant recruitment and data interpretation.

Nineteen participants attended one of three focus groups during which the moderator guided the groups to cover all three objectives using a semi-structured format. The moderator guide was developed to elicit caregivers' experiences with asthma, as well as their beliefs related to and understanding of their child's asthma. The guide also was developed to elicit reactions to culturally tailored public health messages about uncontrolled asthma. Two of the focus groups were conducted in English and one was conducted in Spanish. Each focus group was approximately two hours long and the recorded audio was transcribed for analysis.

Public health messaging materials were created by students from the University of Texas at Austin School of

Advertising. Three prototypical message boards were created with different versions of text intended to inform viewers of the signs, symptoms and frequency criteria for uncontrolled asthma according to National Asthma Education and Prevention Program (NAEPP) guidelines. Accompanying visuals were selected for each board and included scenes of family gatherings, hospital emergencies, and healthy or unhealthy children. Participants were shown these messaging boards during the focus groups and asked to indicate their reactions and preferences. Scanned copies of the message boards can be found in the [Appendix](#).

Five members of the research team observed the focus groups through one-way glass and with audio and took notes throughout. The team discussed their initial impressions of each group with the moderator at the close of each group. Initial impressions were revisited reflexively, once the researchers had begun open coding of the transcripts, to triangulate those impressions with what emerged from the thematic analysis.

The transcripts were qualitatively analyzed using a thematic analysis approach similar to the methodology detailed by Norris et al (2017) with open coding of the selected text, followed by axial and selective coding (10). An initial coding framework was developed based on study objectives and preexisting knowledge based on prior studies. These initial codes were subject to modification throughout the open coding period. During open coding, three research team members independently performed line-by-line coding of the transcript, and then met to discuss discrepancies in assigned codes until consensus was reached on code assignment for the selected text. Each selection could be labeled with more than one code. Initial coding was followed by axial and selective coding wherein codes were grouped into subcategories, and then again until the seven broader themes emerged that are presented in the results section. Thematic saturation was reached by the second transcript, after which no new codes emerged during analysis.

Results

Participant demographics are summarized in [Table 1](#). In-depth analysis of the focus group transcripts using the coding methodology described above yielded several key categories characterizing the processes and factors that shape how caregivers perceive, understand and respond to their child's asthma. These were divided into codes relating to caregivers' general asthma perceptions and practices – Assessment, Management, Emotion, Support, Trust ([Table 2](#)), and codes related to caregiver reactions to public messaging materials ([Table 3](#)).

Themes emerging from the interviews

Assessment

Caregivers expressed confidence in recognizing their child's symptoms and triggers, but noted some barriers to timely recognition of symptoms. These included difficulty distinguishing asthma symptoms from other conditions (e.g. a

Table 1. Participant Characteristics ($n=19$).

Caregiver/Household characteristics	Number of participants (%)
Gender	
Male	8 (42%)
Female	11 (58%)
Race or Ethnicity	
African American	4 (21%)
Hispanic/Latinx	15 (79%)
Insurance	
Public	11 (58%)
Private	8 (42%)
Average Household Income	\$47,545

Table 2. Caregiver perceptions and behaviors relating to child's asthma: final categories with definitions and illustrative quotes.

Category	Definition	Example
Assessment	Caregiver's general knowledge about asthma (e.g. triggers, symptoms, asthma control) and the application of that knowledge to characterize their child's asthma	<i>When older, the wheezing and the coughing come up, then it's time to take it a little bit more seriously.</i>
Emotion	Caregiver and/or child's negative or positive emotions about asthma, including anxiety, frustration, and acceptance	<i>I actually delayed him starting school, because I was terrified of him going to school, and someone else having to take that [management] burden on.</i>
Management	Activities undertaken by the caregiver to prevent and/or alleviate child's asthma symptoms, e.g. limiting activities, avoiding triggers, alternative or non-pharmacological treatments, and seeking formal medical care	<i>We did physical therapy, kind of to help her with the breathing... and if it does get worse, then we'll go to the doctor, the ER.</i>
Support	Perceived and actual support or lack of support from others, in the forms of tangible, emotional, and informational support	<i>When I had my daughter in softball, some of the other parents ...didn't take it as serious as me... there's a lack of understanding on their part.</i>
Trust	Caregiver's trust or distrust of the credibility, intentions and competence of others (e.g. HCWs, schools, other caregivers) in caring for their child's asthma	<i>For me, [the pediatrician] told me my son was too young to be diagnosed. I told them they were liars, because he clearly has a problem breathing.</i>

cold, a panic attack), having to rely on the assessment of others when the primary caregiver is not present, and the inability of the child to self-monitor or express how they are feeling.

Many caregivers were familiar with the general categories used to define asthma control (nighttime awakenings, ER visits, asthma symptoms, etc) but were less familiar with specific criteria. Some caregivers described relying on asthma emergencies as an indicator of uncontrolled asthma:

It wasn't controlled when we were having to go to the ER. That's another way I know it's controlled, because last year we only went to the ER once. Before that, it was twice a month, easy.

In some instances, caregivers interpreted questions about asthma control to mean their own subjective sense of control over their child's condition – i.e. how well do they feel they

are managing their child's symptoms and exacerbations – rather than assessing asthma control with the objective symptom criteria.

Management

Caregivers expressed discomfort and hesitation with using controller medications on a daily basis, which is discussed further in the Emotion category. Instead of medication management, participant caregivers indicated a preference to control their child's external environment or triggers, including limiting physical activity and minimizing exposure to potential triggers (e.g. smoking, playing outside), as a way of managing symptoms and limiting asthma exacerbations.

In addition to rescue inhalers, participants reported use of nonpharmacologic management strategies, including physical therapy and relaxation techniques, to alleviate asthma symptoms and reduce the severity of exacerbations. Many caregivers indicated a preference to treat asthma exacerbations at home and evaluate symptom response to rescue medications and/or nonpharmacological management methods before taking their child to the clinic or emergency department, citing the availability and ease of home treatments.

Participants were aware of a variety of alternative remedies for asthma stemming from cultural or popular beliefs, including Vicks Vaporub, hot coffee, using a humidifier or shower steam, and aromatherapy. Caregivers expressed interest in learning about alternatives to medications for long-term asthma management, and wished their providers would discuss these methods with them:

I suspect that there's other methods, other ways, like weight loss or like yoga. Or like stuff for anxiety, you don't have to be on medication, you can deal with other ways. We just don't know about it, we don't see commercials about it, it's not promoted.

Many participants were unsure about when to seek routine and/or emergency care for their child. Caregivers described difficulties in identifying true asthma emergencies from non-emergencies, and previous negative encounters with the health care system, as barriers to seeking timely treatment. However, other participants were more proactive about seeking medical attention, citing past experiences that remind them to stay vigilant:

The first time my son got pneumonia, and we went to the hospital, I waited a day. That's when he was about one. I felt really bad. They actually had to admit him, because he was so little and he had pneumonia. Never again. That's probably why I play zero games, because I feel like it could go really bad, really fast.

Emotion

Asthma-related anxiety was a prevalent theme and was mostly centered on the unpredictability of asthma exacerbations. Caregivers worried about not being present to help control an exacerbation, not being able to identify or avoid exposure to triggers, and being unprepared to manage an exacerbation:

Table 3. Reactions to asthma public health messages: final categories with definitions and illustrative quotes.

Category	Definition	Example
Messaging-Emotion	Relating to caregiver's emotional reactions to public messaging materials including guilt, shame, and fear	<i>I don't like that it's telling me that [the asthma] is not under control. Or that I'm not doing my job or that I don't know or that I'm unaware of how my child is.</i>
Messaging-Identification	Caregiver finds messaging relatable and/or representative of their family's identity	<i>I was going to say [I relate to] the family thing, because asthma is a family diagnosis. Everybody goes through it with the child. My older daughter is super vigilant over her brother. She's always telling him, "You need to calm down. Where's your inhaler?"</i>
Messaging-Assessment	Caregiver recognizes or fails to recognize their own child's experience in the messaging materials and/or perceives the materials as relevant to them	<i>... but [this message] is for someone who doesn't know how to recognize symptoms that can become serious. To me this message is more for prevention or education for someone who doesn't know" (translated from Spanish)</i>
Messaging-Management	Caregiver recognizes or fails to recognize the need to change their behavior/management of their child's asthma in response to the messaging materials	<i>Interviewer: If you saw this ad tomorrow, would you do anything differently? No, because I already do this.</i>

There's a lot of unknowns: when [the attack] could happen, where they would be, where are you, are you prepared, are you driving, are you at a store.

Caregivers generally worried about asthma exacerbations requiring ER visits and hospitalizations more than the daily impairments caused by uncontrolled asthma. Anxiety also stemmed from caregivers' perception of their child's inability to reliably identify and/or articulate their symptoms or manage their asthma independently.

Self-perceived lack of health literacy or knowledge about asthma was another source of frustration and anxiety for caregivers, especially early after the child's diagnosis. Caregivers felt discouraged and frustrated by a perceived lack of patient-centered care and lack of participation in shared decision-making.

Caregivers expressed negative emotions centered on asthma medications, including concerns about long-term side effects of daily medications, beliefs that health care providers have outside financial interests affecting their prescribing practices, feeling overwhelmed by the variety of treatment types (inhalers, spacers, pumps, nebulizers, etc), concerns about the long-term efficacy of medications and developing tolerance, and the cost/affordability of medications.

While negative emotions were prevalent amongst the participants, some positive emotional states such as hope, acceptance and confidence also emerged in our thematic analysis. Caregivers expressed hope that their child could maintain functionality and normalcy despite a diagnosis of asthma, that their child would "grow out" of their asthma, and some caregivers expressed confidence in their child's own ability to manage asthma.

Trust

Caregivers expressed trust or distrust in health care providers and supportive caregivers (e.g. school/daycare, spouse/co-parent, relatives), depending on perceived reliability and prior experiences. While some participants described having positive relationships with their child's physician, a lack of

trust in health care providers was a common theme that emerged in the transcripts. Participants additionally recalled instances where their concerns were dismissed and other negative encounters with the health care system. In these cases, caregivers had to advocate for their child in order to receive care:

...I tried to see the pulmonologist, they were like "We don't see kids until six." I'm like "My son can't wait until six." I didn't get cooperation at first, but I called every day until he agreed to see me.

Caregivers also voiced uncertainty about the school's ability to appropriately manage their child's asthma, such as recognizing an asthma exacerbation and responding with the appropriate measures, and disagreed with school policies about asthma management:

It was real [sic] hard to manage it at my daughter's school. That's why she's homeschooled now, because it was almost impossible. She would come home and her face would be red and she was like, "Dad, I'm wheezing." ... It was real [sic] hard for her to get to the nurses station to get her inhaler.

While some caregivers felt confident about entrusting their child's asthma management to a supportive caregiver, others lacked this confidence:

My son goes with his dad every other weekend. There have been times when I feel like, "Okay, what if he needs a treatment and he doesn't get it?" So that's on the back of my mind once in a while, just worry, concern. And I'm always calling like, "Are you okay? How are you feeling?"

Support

Caregivers discussed three types of support pertaining to their child's asthma management: tangible, informational and emotional support. Schools, daycares, relatives, and co-parents/spouses were identified as sources of tangible support (i.e. material, financial, or care support) for caregivers of children with asthma. However, caregivers perceived a lack of emotional support, understanding or sympathy from others in the community who do not have

children with asthma, as well as from their child's schools and teachers (Table 2).

Some caregivers received informational support (education or information related to asthma) from additional family members or a spouse with asthma, as well as from the health-care system (ER staff, school nurses, primary care providers, specialists). When caregivers felt they received a lack of information and guidance from health care providers, they were motivated to find information from other trusted sources.

Messaging

Messages and imagery alluding to emergencies and the negative consequences of uncontrolled asthma were polarizing, with some caregivers responding positively because it properly communicated urgency and others responding negatively due to evoking fear and anxiety. Caregivers more unanimously had positive reactions to messages and images centered around familial and/or cultural themes, with which they were able to personally identify. On the other hand, the term "uncontrolled asthma," when used in messaging materials, was perceived as accusatory due to caregiver interpretation of the word "control" to mean the level of care or management provided by the caregiver (Table 3).

Caregivers did not view the messaging materials as personally relevant because they did not appear to recognize uncontrolled asthma in their own child. Many believed the messages were targeted to those who were not familiar with asthma as a diagnosis, and/or felt they were already doing what the messaging materials recommended (Table 3).

Discussion

This qualitative study provides insight into the perceptions of and barriers to asthma control in Black and Latinx caregivers of children with uncontrolled asthma. As is consistent with previous literature, many participants in this study had negative perceptions of daily controller medications. Management practices described by caregivers were mainly focused on avoiding environmental triggers, limiting physical activity, and rescue inhalers. Caregivers expressed negative emotions about their child's asthma (e.g. anxiety, fear, frustration), which largely stemmed from their distrust of others and a perceived lack of support.

All caregivers in the study reported asthma symptom frequencies that met criteria for uncontrolled asthma in their children. However, many of the participants did not appear to recognize that their child had uncontrolled asthma. This discrepancy is consistent with previous studies where caregivers or participants with asthma overestimated their child's or their own level of control (9). In our study, caregivers similarly exhibited a high threshold for identifying poor asthma control, and described relying on asthma emergencies or acute visits as a way of identifying poor asthma control. By contrast, caregivers were less worried about non-emergent asthma symptoms, even when they occurred frequently, and seemed to normalize the daily impairments and low quality of life that accompanies uncontrolled asthma as an inevitable reality.

Despite having support from friends, family, and schools, caregivers described feeling unsupported with the burden of their child's asthma because those around them were unfamiliar with asthma and its management, which manifested as anxiety in many of the participant caregivers. Recent studies suggest that caregiver depression, anxiety and poor coping can have a significant impact on asthma control in children (11,12). The utilization of peer support programming for caregivers of children with asthma should be further explored as a tool for increasing resilience for families of children with asthma. Furthermore, this finding highlights the necessity of providing broader education and support to those who are involved in the child's daily activities, such as school nurses and teachers, daycare/after school providers, and sports coaches.

In a qualitative study by Bellin et al. caregivers exhibited a preference in forming social circles with fellow parents of children with asthma who could be entrusted with the care of their child (13). During our focus groups, participants not only exchanged stories but also shared knowledge amongst themselves during break times. One participant was especially familiar with guideline-based asthma management practices and sought to disseminate this information to her peers. Thus, peer support groups, moderated by an asthma educator, may be a promising avenue for reinforcing asthma knowledge and best practices amongst caregivers.

Caregivers in this study expressed hesitance toward use of controller medications for asthma control largely due to concerns about side effects and perception of risk of dependence. These findings are congruent with existing literature on medication adherence in racial and ethnic minority children with asthma (14,15). One novel finding from this study was that caregivers were particularly concerned about providers having financial incentives to prescribe medications against the best interests of their child. This could derive, at least in part, from distrust due to historical injustices that have been committed by medical institutions against communities of color.

Previous studies have shown that use of complementary and alternative medicine (CAM) in asthma management is more common in minority groups, including both African-American and Latinx communities, either as a supplement to or in lieu of conventional modalities (14). Similarly, caregivers in our study exhibited a preference for using nonpharmacological techniques (e.g. yoga, breathing exercises to reduce anxiety) as a first-line treatment for mild symptoms or for preventing exacerbations. In an effort to improve trust with minority communities, providers should explore caregiver use of CAM during visits in a respectful, culturally appropriate manner, and consider supporting the safe use of CAM as adjunctive therapy in addition to more evidence-based treatments to establish asthma control.

Notably, caregivers were preoccupied with controlling their child's environment and avoiding perceived triggers as a way of achieving asthma control. The importance of environmental control should not be discounted as an asthma management strategy; one study showed that children of caregivers who regularly practiced "avoiding triggers" had significantly better asthma control and pulmonary function (16). However,

low-income and racial and ethnic minority children and their caregivers tend to face greater barriers in managing their exposures, due to living in urban areas with poor housing conditions and more environmental pollutants that contribute to worse asthma outcomes in these groups (17).

Finally, this is the first study to our knowledge that evaluates participant reactions to culturally-tailored public messaging materials about asthma control. Our findings suggest that it may be beneficial to focus future health communications on helping caregivers establish higher expectations for their child's asthma control and "de-normalize" the negative daily impacts of poorly controlled asthma. However, the low level of provider trust elicited in these focus groups suggests that these health messaging interventions should be delivered from trusted sources, and ideally outside of the healthcare setting, for greater uptake. While more personalized educational interventions are likely to be more effective in motivating behavior change, public health messaging campaigns that are culturally tailored and delivered by a trusted source (i.e. someone perceived to be in the target audience's community) can further reinforce these messages in a cost-effective manner.

Limitations

Recent studies have highlighted considerable variation in asthma-related beliefs and practices between different Latinx subgroups (18–21). However, no data were collected regarding the specific ethnicities of the Latinx participants, and the small sample size would have precluded any meaningful subgroup analysis. Future studies should seek to further characterize caregiver experiences and perceptions among different Latinx subgroups.

Furthermore, the focus groups were conducted in partnership with a marketing firm, so the study population was drawn from their database of participants, which may be less representative of the target population.

Conclusion

Understanding caregiver perspectives, especially within populations at risk for uncontrolled asthma, is essential for informing the development of effective public health messaging and supportive interventions that can optimize childhood asthma management in minority populations. It is recommended that culturally tailored interventions address low trust in provider recommendations and caregiver concerns about the daily dosing of controller medications.

Acknowledgements

The authors would like to acknowledge Think Group and Myra Spector for their contributions in participant recruitment and moderating the focus groups.

Declaration of interest

The authors have no conflicts of interest to disclose.

Funding

This study was supported by the following National Institutes of Health grants: K24AI114769 R01ES023447 and R01ES026170, as well as the CHER Grant Program through the Moody College of Communications at the University of Texas at Austin.

ORCID

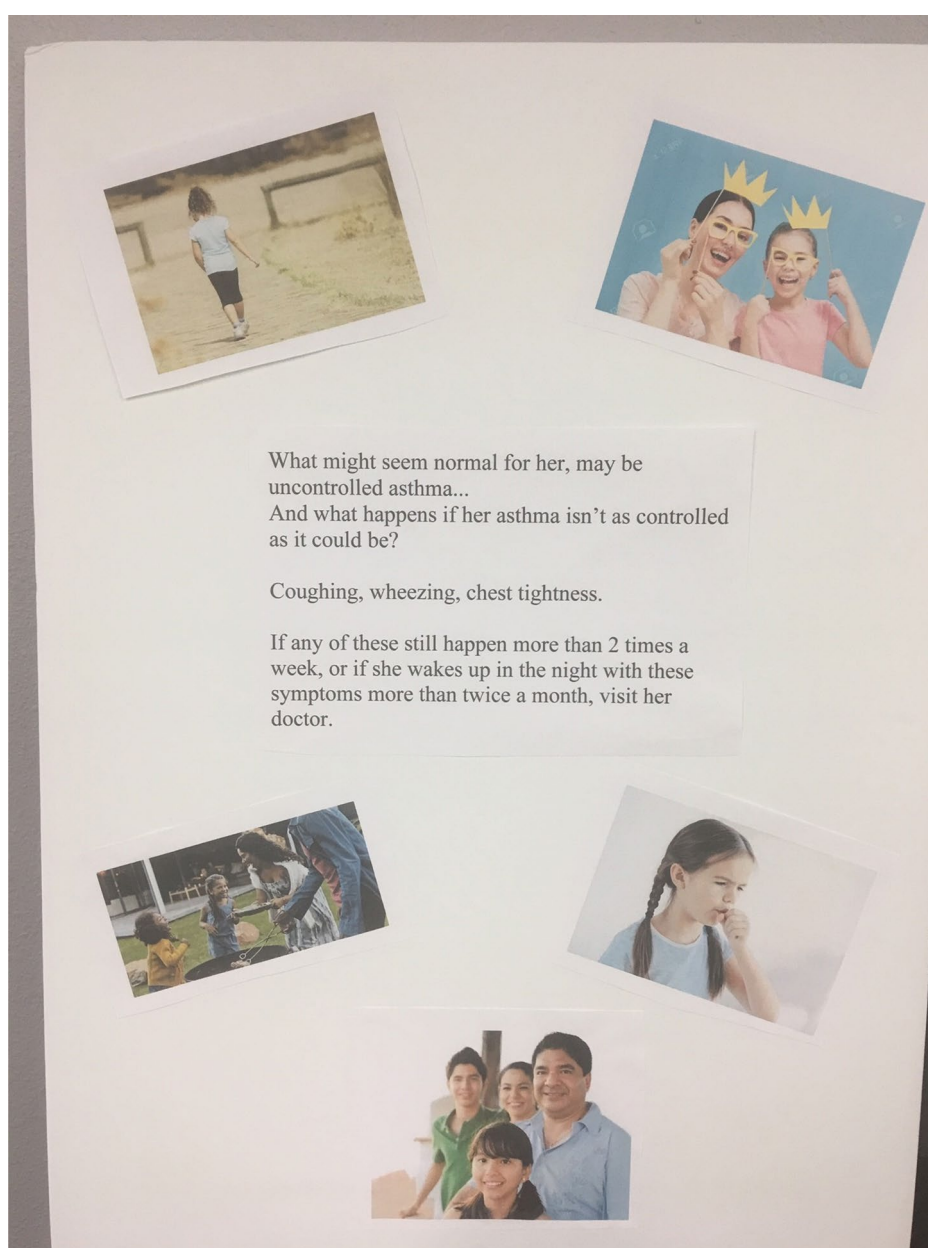
Michelle Zheang  <http://orcid.org/0000-0002-7345-6688>

References

- Guilbert TW, Garris C, Jhingran P, Bonafede M, Tomaszewski KJ, Bonus T, Hahn RM, Schatz M. Asthma that is not well-controlled is associated with increased healthcare utilization and decreased quality of life. *J Asthma*. 2011;48(2):126–132. doi:10.3109/02770903.2010.535879.
- Akinbami LJ, Moorman JE, Simon AE, Schoendorf KC. Trends in racial disparities for asthma outcomes among children 0 to 17 years, 2001–2010. *J Allergy Clin Immunol*. 2014;134(3):547–553.e5. doi:10.1016/j.jaci.2014.05.037.
- Zahrn HS, Bailey CM, Damon SA, Garbe PL, Breyse PN. Vital signs: asthma in children - United States, 2001–2016. *MMWR Morb Mortal Wkly Rep*. 2018;67(5):149–155. doi:10.15585/mmwr.mm6705e1.
- AsthmaStats: Uncontrolled Asthma among Children, 2012–2014 | CDC. https://www.cdc.gov/asthma/asthma_stats/uncontrolled-asthma-children.htm. 2019.
- Keet CA, McCormack MC, Pollack CE, Peng RD, McGowan E, Matsui EC. Neighborhood poverty, urban residence, race/ethnicity, and asthma: rethinking the inner-city asthma epidemic. *J Allergy Clin Immunol*. 2015;135(3):655–662. doi:10.1016/j.jaci.2014.11.022.
- de Groot EP, Nijkamp A, Duiverman EJ, Brand PLP. Allergic rhinitis is associated with poor asthma control in children with asthma. *Thorax*. 2012;67(7):582–587. doi:10.1136/thoraxjnl-2011-201168.
- Butz AM, Bellin M, Tsoukleris M, Mudd SS, Kub J, Ogborn J, Morpheus T, Lewis-Land C, Bollinger ME. Very poorly controlled asthma in urban minority children: lessons learned. *J Allergy Clin Immunol Pract*. 2018;6(3):844–852. doi:10.1016/j.jaip.2017.08.007.
- Pappalardo AA, Karavolos K, Martin MA. What really happens in the home: the medication environment of urban, minority youth. *J Allergy Clin Immunol Pract*. 2017;5(3):764–770. doi:10.1016/j.jaip.2016.09.046.
- Liu AH, Gilsenan AW, Stanford RH, Lincourt W, Ziemiecki R, Ortega H. Status of asthma control in pediatric primary care: results from the pediatric Asthma Control Characteristics and Prevalence Survey Study (ACCESS). *J. Pediatr*. 2010;157(2):276–281.e3. doi:10.1016/j.jpeds.2010.02.017.
- Nowell LS, Norris JM, White DE, Moules NJ. Thematic analysis: striving to meet the trustworthiness criteria. *Int J Qual Methods*. 2017;16(1):1609406917733847. doi:10.1177/1609406917733847.
- Rodríguez EM, Kumar H, Alba-Suarez J, Sánchez-Johnsen L. Parental coping, depressive symptoms, and children's asthma control and school attendance in low-income, racially, and ethnically diverse urban families. *J Asthma*. 2017;54(8):833–841. doi:10.1080/02770903.2016.1274402.
- Weinstein SM, Pugach O, Rosales G, Mosnaim GS, Walton SM, Martin MA. Family chaos and asthma control. *Pediatrics*. 2019;144(2):e20182758. doi:10.1542/peds.2018-2758.
- Bellin MH, Land C, Newsome A, Kub J, Mudd SS, Bollinger ME, Butz AM. Caregiver perception of asthma management of children in the context of poverty. *J Asthma*. 2017;54(2):162–172. doi:10.1080/02770903.2016.1198375.

14. McQuaid EL. Barriers to medication adherence in asthma: the importance of culture and context. *Ann Allergy Asthma Immunol*. 2018;121(1):37–42. doi:[10.1016/j.anai.2018.03.024](https://doi.org/10.1016/j.anai.2018.03.024).
15. Butz AM, Kub J, Bellin MH, Frick KD. Challenges in providing preventive care to inner-city children with asthma. *Nurs Clin North Am*. 2013;48(2):241–257. doi:[10.1016/j.cnur.2013.01.008](https://doi.org/10.1016/j.cnur.2013.01.008).
16. Raymond KP, Fiese BH, Winter MA, Knestel A, Everhart RS. Helpful hints: caregiver-generated asthma management strategies and their relation to pediatric asthma symptoms and quality of life. *J Pediatr Psychol*. 2012;37(4):414–423. doi:[10.1093/jpepsy/jss001](https://doi.org/10.1093/jpepsy/jss001).
17. Matsui EC. Environmental exposures and asthma morbidity in children living in urban neighborhoods. *Allergy*. 2014;69(5):553–558. doi:[10.1111/all.12361](https://doi.org/10.1111/all.12361).
18. Arcoleo K, et al. Explanatory model for asthma disparities in Latino children: results from the Latino childhood asthma project. *Ann Behav Med*. 2019. doi:[10.1093/abm/kaz041](https://doi.org/10.1093/abm/kaz041).
19. Mitchell DK, et al. Latino caregivers' beliefs about asthma: causes, symptoms, and practices. *J Asthma*. 2008;45:205–210.
20. Arcoleo K, Zayas LE, Hawthorne A, Begay R. Illness representations and cultural practices play a role in patient-centered care in childhood asthma: experiences of Mexican mothers. *J Asthma*. 2015;52(7):699–706. doi:[10.3109/02770903.2014.1001905](https://doi.org/10.3109/02770903.2014.1001905).
21. Arcoleo KJ, McGovern C, Kaur K, Halterman JS, Mammen J, Crean H, Rastogi D, Feldman JM. Longitudinal patterns of Mexican and Puerto Rican children's asthma controller medication adherence and acute healthcare use. *Ann ATS*. 2019;16(6):715–723. doi:[10.1513/AnnalsATS.201807-462OC](https://doi.org/10.1513/AnnalsATS.201807-462OC).

Appendix: Prototype messaging boards





He's growing up fast.
Everyone says he looks so healthy.

But if coughing, wheezing or chest tightness still
happen more than 2 times a week, or if he wakes
up at night with symptoms more than twice a
month, his asthma is not under control.

Visit his doctor.





Coughing, wheezing, chest tightness.

If any of these still happen more than 2 times a week, or if she awakens during the night with these symptoms more than twice a month, visit her doctor.

Asthma Emergencies Are Frightening.

What might seem normal for her, may be uncontrolled asthma...and that raises her risk of an Asthma Emergency.

